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ABSTRACT

Because of girls' relatively low motivation to pursue math studies, this project's purposes were to expand girls' career choice possibilities, to increase the quality of motivation and career guidance offered by counselors and teachers, and to involve parents of ninth-grade girls by providing specific information about the project and about math-related career opportunities. Twenty-five ninth-grade girls at each of two high schools were selected to participate. Project activities included setting up a series of visitations for students with leaders in business, industry, and the professions. Successful role models visited the campus to talk with students, parents, teachers, and counselors. Also, as a part of the project, inservice meetings were held for teachers and counselors to assist them in providing better career motivation and guidance to girls. The results of the project showed (1) an increased number of girls enrolling in math; (2) an increased level of confidence in math; (3) an increased number of girls choosing a math-related career; and (4) an increased awareness and interest by teachers, counselors, and parents. (The questionnaires, surveys, and project performance management forms are appended.) (Author/LRA)

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FINAL REPORT

MOTIVATING GIRLS TO PREPARE FOR MATH-RELATED OCCUPATIONS

TORRANCE UNIFIED SCHOOL DISTRICT

PROJECT DIRECTOR: Kathryn Lewis, Ph.D.
PROJECT MANAGER: Barbara Prillwitz
PROJECT NUMBER: 19-65060-3-8-231

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ABSTRACT

Girls are generally considered to have relatively low motivation to pursue courses of study involving math. They show less confidence and competency in that area than do boys, particularly after early adolescence. This creates serious limitations in the occupational choices available to girls. Therefore, this project targeted ninth grade girls, their teachers, counselors and parents for intensive work in math motivation.

The specific purposes of the project were:

1. To expand the career choice possibilities for girls by:
    a. Exposing them directly to math-related occupations in the community.
    b. Increasing their confidence to perform competently in math.
    c. Helping them discover the relevancy of math to other courses in school and to specific vocational goals.

2. To increase the quality of motivation and career guidance offered by counselors and teachers by:
    a. Exposing them to career opportunities in the community which require math skills.
    b. Increasing their awareness of sex-role stereotyping.
    c. Assisting them to motivate students to expand their career objectives.

3. To involve parents of ninth grade girls by providing specific information about the project and about math-related career opportunities.

The project manager worked with leaders in business, industry and the professions to set up a series of visitations for students, and to contact successful role models who would visit the campus to talk with students, parents, teachers and counselors.

The project manager organized inservice meetings for teachers and counselors to assist them to provide better career motivation and guidance to girls.

While the project was directed specifically to ninth grade girls with math potential and low motivation, it was expected to benefit math students in general as teachers and counselors gained more information about math-related occupations, motivation, and sex role stereotyping.

The results of the project showed: (1) an increase in the number of girls selecting math in the tenth and eleventh grades; (2) an increase in their level of confidence in math; (3) an increase in the number of girls choosing math-related careers; and (4) an increased awareness and interest in math-related careers for women by teachers, counselors and parents.

THE PROBLEM

Girls are generally considered to have relatively low motivation to pursue the study of mathematics. They seem to show less confidence and competency in higher math than boys. This is particularly apparent after early adolescence, a time when critical decisions regarding academic futures are made.

In reviewing the available data in the Torrance Unified School District, the following information was found:

1. SAT Scores. A three year survey of College Entrance Examination Board (CEEB) Scholastic Aptitude Test (SAT) scores of Torrance seniors yields the following:

SAT Scores - Math

	1975 High School		1976 High School		1977 High School	
	A	B	A	B	A	B
Girls	472	465	476	482	475	469
Boys	555	530	530	510	550	539

2. Math Courses Completed. An inspection of the math courses completed by Torrance high school boys and girls who graduated in 1977 shows the following:

Percent of Boys and Percent of Girls Completing Advanced Math Courses 1973-74 through 1976-77

	Algebra II	Trig./ Anal. Geo.	Calculus
Boys	19%	11%	7%
Girls	15%	6%	3%

A larger percentage of boys than girls continue with advanced math courses; whereas a larger percentage of girls than boys select what are often terminal classes in algebra or geometry.

3. Graduate Survey. A graduate survey coordinated on a district-wide basis in Torrance was conducted for the Class of 1975, one and one-half years after graduation. It showed that 40% of the boys and 25% of the girls chose mathematics or related fields as a college major or were employed in an occupation requiring a math preparation.

Occupational choices can be seriously limited if there are deficiencies in the math background. Because the study of mathematics is built upon a sequential series of skills, it is important that students realize early in their academic careers the importance and the value of strong mathematical preparation. Since many careers which offer high financial rewards and professional status require three or more years of math, it is believed that if we can encourage girls to explore career options early in their schooling they will begin to realize the importance of adequate preparation.

STATEMENT OF THE PROBLEM

This project was designed to:

1. Help increase the number of ninth grade girls who understand, value and pursue educational and vocational goals involving mathematics.

2. Help counselors and teachers gain a more accurate perception of current and future career possibilities which necessitate a background in mathematics.

3. Assist counselors and teachers to provide career guidance which avoids sex-role stereotyping.

4. Work with ninth grade girls with math potential and low motivation to help them gain both confidence and competency in mathematics classes.

5. Help parents of ninth grade girls gain understanding of the relevance of math to other parts of curriculum and to a wide selection of vocational goals.

6. Involve representatives of business, industry and the professions who will work with students and school personnel in motivating students to consider mathematics as a foundation for career development.

RELEVANT RESEARCH

Research shows that males excel more than females in math beginning at the high school level. "In our society, young women appear to lack motivation or encouragement to succeed in mathematics, an area usually considered a male domain." (Kreinberg, 1976). However, in a sample of 1324 children, grades 2-12, Ernest (1976) found no statistically significant sex differences in regard to liking mathematics.

In an attempt to understand the decreasing participation of women to elect math in higher grades, Armstrong (1978) found that females pursue math because of their educational aspirations; whereas, males continue to elect math because of parental expectations. It appears that if parents expected their daughters to pursue math, enrollments might increase.

A major finding by Fox (1976) was the failure to attend to the social interests of girls in presenting math. Since mathematical courses are theoretical in nature and girls are social in nature, this factor reduced their success and participation in math. Coinciding with Armstrong's findings, Fox found that no attempt was made to emphasize the relevance of math to career goals; therefore, girls experienced a reduction in successfully completing the math program.

In "Mathematics and Women's Careers" Charlotte MacDonald's report concluded the same results: girls elect to take math depending on the amount of education planned after high school. She stated that girls may simply be unaware that math is an important door-opener to many careers.

Tobias (1978) found that girls slack off in math because it "requires more work and commitment each year as it gets harder." Girls have an excuse to avoid math and boys don't. The expectation that math is not necessary for females seems to interfere with girls' desire to learn math.

An Educational Testing Services study found that girls are diverted from careers in math by counselors, teachers and parents. We don't let students drop English because they have trouble spelling or because their grammar is imperfect. (Casserly, 1978). It would be possible to create the same climate in math classes by encouraging young girls to continue participating beyond the tenth grade. The successful math programs rely on older girls to counsel, encourage and tutor younger ones (Casserly, 1978). The extra attention gives yound girls the confidence to handle math and they begin to see the possibilities of math or science careers.

Since early adolescence is a critical time for girls to elect to pursue math courses, the target group for this project was ninth-grade girls. The research shows that girls do not participate in math to the same extent as boys; therefore, one of the goals of the project was to help increase their participation and to continue their study of math.

Since the educational aspirations of girls seems to influence their participation in higher math courses, one of the aims of this study was to expand their awareness of the opportunities for women in math-related careers.

PROCEDURES

Selection of Students

Twenty-five ninth grade girls at each of two high schools were selected using:

1. Scores from their eighth grade California Test of Basic Skills (CTBS). Girls whose scores ranged from the 66th %ile to 100th %ile were selected.

2. Final grades from their eighth grade math courses and first quarter ninth grade math were tabulated.

3. Recommendations from ninth grade math teachers were collected.

Treatment

The project manager met with small groups to explain the goals of the project and invite their participation. They completed data questionnaires and attitudinal surveys. (See Appendix B, pages 17 - 20)

An evening meeting was scheduled for the participating students and their parents to again discuss the goals of the project.

A luncheon was scheduled at each school. Participating ninth grade students were given the opportunity of informal small group conversations with successful role models in Engineering, Science and Business.

A panel of both successful men and women from industry presented a realistic view of the needs of business and industry.

A community advisory group was established to help identify business and industrial firms willing to assist in the project.

Off campus tours were scheduled with the special focus of visiting with women professionals in their work environment.

Trips included visits to Aerospace Companies, Computer Centers and hospitals. Also to special programs sponsored by Universities, Women Engineers, Women in Aviation, and a Math Science Workshop.

District buses were utilized to transport students.

Role models were invited to the schools throughout the year, for either specific programs or informal lunch-hour presentations. Each school participated in a program "Women in Science" sponsored by The National Science Foundation.

The culminating activity was an evening workshop for students and parents where they had an opportunity to experience math as used by Engineers, Scientists and Business.

Inservice for Participating Teachers and Counselors

Four teachers and two counselors from each of the two participating schools volunteered to participate in the program. A series of workshops was scheduled throughout the year.

The first seminar focused on sex-role stereotyping. Current research was reviewed and needs for greater awareness to the subtle form of stereotyping were discussed.

Teachers and counselors met with representatives from twenty major business and industrial firms in the area. After an overview of the project and a discussion of the needs of the industrial community, small groups consisting of a school administrator, counselor, teacher, business representative and role models spent time in a brain-storming session, trying to establish ways in which business and education can work together to help encourage capable young women to explore math-related careers.

At a dinner meeting panel presentations by women engineers, women in science and medicine and women in business gave a broad overview of needs, demands and rewards of the various fields and provided an opportunity for personal contact and informal discussion.

The focus of the math anxiety workshop was to help teachers and counselors recognize the math anxious student and provide support and materials that would help students deal with this anxiety.

Teachers and counselors were invited to meet with scientists and mathematicians at Jet Propulsion Laboratories at the time of the Jupiter By-pass.

A career planning workshop helped teachers and counselors explore career development through the review of life experiences.

Teachers and counselors hosted workshops where role models from Engineering, Science and Business gave students and parents the opportunity to experience math as used in their respective disciplines.

Teachers and counselors contacted members of business, industry and the professions to develop a card file of people willing to assist students by either visiting campus or inviting students to tour their facilities. They participated in a workshop evaluating the progress of the project and offered suggestions for continuing in the future.

Parents

Two evening meetings were scheduled for students and parents. The first at the beginning of the project, to discuss the goals of the project and meet successful role models and representatives from industry who explained to them the current needs and opportunities for young women.

In the final meeting involving parents, a panel of women from Engineering, Science, and Business gave an overview of the opportunities in their career fields. This was followed by workshops demonstrating the use of mathematics in their respective disciplines.

Representatives from Business, Industry, and the Professions

In addition to the community advisory group referred to previously, continual contacts with role models, and representatives from industry, business and professional organizations such as: American Society for Women Engineers, Women in Management, Women Architects and the Womens Committee of Aerospace provided invaluable assistance in their willingness to assist with the project.

RESULTS

A pre and post data questionnaire and attitudinal survey were administered to the participating students.

Teachers and counselors were also given a pre and post attitudinal survey. Parents were asked to respond to an evaluation survey at the culmination of the project.

The following results were obtained from the data:

A comparison of the 10th grade students enrolled in math classes in the fall of 1978 and those electing to take math in the tenth grade in the fall of 1979 showed a 6% increase in the numbers of girls making this choice.

HIGH SCHOOL	1978-79	1979-80
SOUTH HIGH	85%	93%
WEST HIGH	87%	90%
Average	86%	92%

A comparison of tenth/eleventh grade students enrolled in the fall of 1978 and those electing math in the fall of 1979 showed a 20% increase.

HIGH SCHOOL	1978-79	1979-80
SOUTH HIGH	39%	58%
WEST HIGH	37%	58%
Average	38%	58%

At the beginning of the project, girls were asked to list their first three career choices. These were compared with responses to occupations listed at the end of the project. 18% more girls indicated an interest in math-related careers. (See Appendix B, pages 17 and 22)

Using a pre and post attitudinal survey, it was found that 49% felt more confident in their ability to handle math and 52% indicated a reduction in math anxiety. 86% of the girls were able to show relevancy between math and five other school subjects. Thirty-nine girls were able to describe accurately five occupations of interest to them which required math skills. (See Appendix B, pages 19 and 23)

It was found that in a sampling of teachers and counselors taken in December, no participants described fifteen occupations requiring math competency. In June, 63% of the fourteen teachers and counselors described fifteen occupations. (See Appendix B, pages 24 - 26)

An attitudinal survey administered in December and again in June to participating counselors and teachers showed a 5% positive change in their expectations of females in mathematics. As a result of their participation, counselors and teachers agreed that the knowledge of resources to assist in decreasing sex-role stereotyping had increased. (See Appendix B, pages 24 and 26)

In a questionnaire administered at the culmination of the project, 73% of the 21 parents responding indicated that their knowledge of math-related career opportunities had increased. (See Appendix B, page 28)

CONCLUSIONS AND RECOMMENDATIONS

The project addressed itself to six major areas:

1. Help increase the number of ninth grade girls who understand, value and pursue educational and vocational goals involving mathematics.

   The findings indicate an 18% increase in the number of girls including math in their educational and career plans. Only a longitudinal study could determine whether this increase will persist or improve in the ensuing years.

2. Help counselors and teachers gain a more accurate perception of current and future career possibilities which necessitate a background in mathematics.

   Since the findings indicated a substantial increase (63%) in the number of participating counselors and teachers listing occupations requiring a math background, it is believed that the constant exposure and contact with role models and representatives from business and the professions helped teachers and counselors to become more aware of the possibilities of math-related careers.

3. Assist counselors and teachers to provide career guidance which avoids sex-role stereotyping.

   By constant exposure to successful role models in non-traditional career areas, counselors and teachers will now have the tools to provide counseling that should eliminate sex-role stereotyping.

   It is recommended that an instrument be developed to measure their effectiveness.

4. Work with ninth grade girls with math potential and low motivation to help them gain both confidence and competency in mathematics classes.

   The findings indicated an increase in confidence (49%) and a reduction in anxiety (57%) of the participants.

   It is recommended that more time be allowed in the developmental phase of the project to develop instruments that would be predictive of math potential but not be dependent on academic achievement.

5. Help parents of ninth grade girls gain understanding of the relevance of math to other parts of curriculum and to a wide selection of vocational goals.

   In response to the questionnaire 73% of the parents indicate that their knowledge of math-related career opportunities had increased as a result of their daughter's participation in the program.

   Many of the parents expressed the desire for their daughter's to continue in the project for more than one year.

6. Involve representatives of business, industry and the professions who will work with students and school personnel in motivating students to consider mathematics as a foundation for career development.

The support and cooperation from the business community and professional associations was impressive. They were very supportive in working with students, parents, counselors and teachers. (See Appendix C, pages 30 - 32)

Approximately fifty women in Engineering, Science, Business, and Medicine presented workshops and seminars for teachers and counselors. Over 175 student contacts were made with role models.

A card file has been compiled consisting of approximately 150 names of professionals, representing math-related careers, who are willing to assist teachers, counselors and students.

RECOMMENDATIONS

If the project were to be replicated, the following are recommendations for consideration:

1. A minimum of two months planning should be budgeted before officially beginning the project.

2. Concentrate on the teacher/counselor inservice before there is student involvement.

3. Involve teachers/counselors with workshops that have more personal relevance, experiencing counseling techniques that can effectively be used with students but are satisfying to their own growth. Perhaps there would be more immediate involvement and ownership of the project.

4. Segregate the treatment group into a special class that would be taught by a talented and enthusiastic teacher. They would then be available for special instruction or experience new techniques that may accelerate learning. This would facilitate communication and would be much easier when planning off campus activities as well as having them together for campus visits by role models or representatives from business or colleges.

5. It would be desirable for each teacher participating in the program to select at least five students from the regular classes for whom they would assume responsibility - for special attention, motivation and treatment.

6. Regular meetings should be scheduled to review effective techniques and procedures.

7. The budget should be adjusted to include:

   a. a full-time Project Manager

   b. a full-time clerical staff

   c. money to compensate a teacher or counselor to act as site coordinator.

DISSEMINATION

A summary was compiled which includes the following information:

1. A description of the project including relevant research concerning girls and math aspirations and achievements has been completed.

2. A description of the process used in identifying the girls with math potential has been included.

3. A card file of professionals from business and industry has been developed. Sample available upon request.

4. Descriptions of teacher/counselor inservice sessions has been included.

5. Evaluations have been included along with copies of the forms and questionnaires.

6. Plans are being made to describe the project before the School Board and appropriate conferences.

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APPENDIX A

BROCHURE

APPENDIX B

QUESTIONNAIRES AND SURVEYS

STUDENT DATA QUESTIONNAIRE

1. NAME

_____
Last First Middle

2. ADDRESS

_____
No. Street Apt. City Zip Code

3. HOME PHONE NO._____ 4. DATE OF BIRTH _____

5. SCHOOL ATTENDING ☐ South ☐ West

6. Your liking for school:

☐ Very strong
☐ Fairly strong
☐ Slight liking
☐ Fairly dislike
☐ Strongly dislike

7. Your liking for mathematics:

☐ Very strong
☐ Fairly strong
☐ Slight liking
☐ Fairly dislike
☐ Strongly dislike

8. What math courses are you taking this year?

☐ General Math
☐ Extended Algebra
☐ Algebra I
☐ Algebra II
☐ Geometry
☐ Trigonometry
☐ Calculus
☐ Other

9. Check the statement that best describes how well you are doing in your math class this year.

☐ Highly above average
☐ Slightly above average
☐ Average
☐ Slightly below average
☐ Far below average

10. When you need help with arithmetic or mathematics, do you:

☐ Work it out yourself
☐ Go to your parents for help (Which one?_____)
☐ Go to your teacher
☐ Go to your counselor
☐ Go to a friend
☐ Other _____

11. Do you plan to go on to college? ☐ Yes ☐ No

12. List the three specific occupations that appeal to you most at the present time for a life career.

(a) _____

(b) _____

(c) _____

13. How important will math be for your first choice?

☐ Very important
☐ Fairly important
☐ Not very important
☐ Does not apply to this job.

14. How important will math be for your second choice?

☐ Very important ☐ Not very important
☐ Fairly important ☐ Does not apply to this job

15. How important will math be for your third choice?

☐ Very important ☐ Not very important
☐ Fairly important ☐ Does not apply to this job

16. Who has been the biggest influence in your life regarding your career choice(s)?

☐ Mom ☐ Friend
☐ Dad ☐ Teacher
☐ Relative ☐ Counselor
☐ Brother/Sister ☐ Television/Movies
☐ Own self-interest

17. How much encouragement do you get from your parents to do well in math?

☐ Much encouragement
☐ Average encouragement
☐ Slight encouragement
☐ No encouragement

18. How many years of math do you plan on taking in high school?

☐ One ☐ Three
☐ Two ☐ Four

PARENTAL INFORMATION (OPTIONAL)

19. FATHER

☐ Alive ☐ Deceased
☐ Lives with me ☐ Does not live with me

Occupation: _____

Highest Educational Level He Completed:

☐ Less than grade school ☐ 1 - 3 years college
☐ Grade School ☐ College graduate
☐ Less than high school ☐ Some post-graduate work
☐ High School ☐ M.A. degree or higher

20. MOTHER

☐ Alive ☐ Deceased
☐ Lives with me ☐ Does not live with me

Occupation: _____

Previous occupation if present one is housewife: _____

Highest Educational Level She Completed:

☐ Less than grade school ☐ 1 - 3 years college
☐ Grade School ☐ College graduate
☐ Less than high school ☐ Some post-graduate work
☐ High School ☐ M.A. degree or higher

MATH PROJECT

May 1979

STUDENT ATTITUDINAL QUESTIONNAIRE*

Please use the following rating scale to answer questions 1 - 20.

1 2 3 4 5

Strongly disagree - - - - - - - - - Strongly agree

1.	I am very good at working mathematics problems.	1	2	3	4	5
2.	Math does not scare me at all.	1	2	3	4	5
3.	Taking math tests scare me.	1	2	3	4	5
4.	I dread being called on in a math class.	1	2	3	4	5
5.	I have never liked mathematics.	1	2	3	4	5
6.	Working with numbers is fun.	1	2	3	4	5
7.	I cannot see how mathematics will be useful to me outside of school.	1	2	3	4	5
8.	Not taking high school math would seriously limit jobs that are available to me.	1	2	3	4	5
9.	Mathematics is important to my future educational plans.	1	2	3	4	5
10.	Taking math is a waste of time for me.	1	2	3	4	5
11.	Math teachers make me more nervous than other teachers.	1	2	3	4	5
12.	Doing math problems is usually frustrating.	1	2	3	4	5
13.	I need to know basic arithmetic, but I will not need to know any more mathematics than that.	1	2	3	4	5
14.	I probably will not need mathematics in my future work.	1	2	3	4	5
15.	Math is useful in my daily life.	1	2	3	4	5
16.	If a man and woman are equally qualified for a job, the man should get hired.	1	2	3	4	5
17.	A mother should not have a job while her children are young.	1	2	3	4	5
18.	Men need to know more mathematics than women.	1	2	3	4	5
19.	Fewer females than males have the logical ability to become mathematicians.	1	2	3	4	5
20.	A man would probably feel uncomfortable around a woman who is a "brain" in mathematics.	1	2	3	4	5

List 4 occupations that you think you would be interested in, and describe what you think the entry requirements and job duties would be for those jobs.

OCCUPATIONS	ENTRY REQUIREMENTS	JOB DUTIES

*The Questionnaire was adapted in part from a national assessment of performance and participation of Women in Mathematics.

TEACHER RECOMMENDATION

STUDENT: _____

SCHOOL: _____ DATE: _____

GRADE LEVEL: _____ COURSE: _____

APPROXIMATE GRADE IN COURSE: _____

Rating Scale: 1 2 3 4 5

Low ----------High

1.	Is the student self-motivated?	1	2	3	4	5
2.	Is there continuous participation?	1	2	3	4	5
3.	Does she grasp new concepts easily?	1	2	3	4	5
4.	Does she have confidence in her own ability?	1	2	3	4	5
5.	Do you think the student is capable of being successful in third and fourth year math classes?	1	2	3	4	5
6.	Homework is consistent.	1	2	3	4	5
7.	Student seeks help as needed.	1	2	3	4	5

Student's strengths: _____

_____

_____

Student's weaknesses: _____

_____

_____

8.	Is there an indication that the student could be successful in math-related careers?	1	2	3	4	5
9.	Would you recommend this student for the program?	1	2	3	4	5

MATH PROJECT
May 1979

STUDENT DATA QUESTIONNAIRE

1. NAME _____
   Last First Middle

2. ADDRESS _____
   No. Street Apt. City Zip Code

3. HOME PHONE NO. _____ 4. DATE OF BIRTH _____

5. SCHOOL ATTENDING ☐ SOUTH ☐ WEST

6. Your liking for mathematics: Check Appropriate answer

   ☐ Very strong
   ☐ Fairly strong
   ☐ Slight liking
   ☐ Fairly dislike
   ☐ Strongly dislike

7. Check the statement that best describes how well you are doing in your math class this year.

   ☐ Highly above average
   ☐ Slightly above average
   ☐ Average
   ☐ Slightly below average
   ☐ Far below average

8. Do you plan to go on to college? ☐ Yes ☐ No

9. List the three specific occupations that appeal to you most at the present time-for a life career.

   (a) _____
   (b) _____
   (c) _____

10. How important will math be for your first choice?

    ☐ Very important ☐ Not very important
    ☐ Fairly important ☐ Does not apply to this job.

11. How many years of math do you plan on taking in high school?

    ☐ One ☐ Two ☐ Three ☐ Four

12. What do you feel was most beneficial to you from being involved in the Math Project?

    _____

    _____

13. What do you think would have made the Program better?

    _____

    _____

14. What were some of the obstacles that prevented you from participating in some of the activities?

    _____

MATH PROJECT

May 1979

1. Do you feel more confident about math than before becoming involved in the project?

   Check one:

   1. Feel more confident
   2. Feel less confident
   3. Feel about the same

2. Give an example of how or where math could be used in other subjects. Select five.

Physics	Biology	English
Auto Mechanics	Economics	Accounting
Business Law	History	Bookkeeping
Office Practice	Government	Typing
Computer Science	Chemistry	Industrial Arts

   Example:

MATH PROJECT

May 1979

TEACHER ATTITUDINAL QUESTIONNAIRE *

Please use the following rating scale to answer questions 1 - 15.

1 2 3 4 5

Strongly disagree . . . . . Strongly agree

1.	I expect girls to do well in math.	1	2	3	4	5
2.	I encourage girls to take all the math they can.	1	2	3	4	5
3.	I show a great deal of interest in girls' progress in math.	1	2	3	4	5
4.	I am willing to give boys more individual help in math than girls.	1	2	3	4	5
5.	I usually call on boys in class more so than girls.	1	2	3	4	5
6.	I expect boys to do better in math than girls.	1	2	3	4	5
7.	Boys have a natural affinity for math.	1	2	3	4	5
8.	I enjoy teaching girls as much as boys.	1	2	3	4	5
9.	I call on girls in class as much as boys.	1	2	3	4	5
10.	I encourage girls as much as boys to do well in math.	1	2	3	4	5
11.	Early career plans are important in the development of math-related careers.	1	2	3	4	5
12.	Boys have less "math anxiety" than girls.	1	2	3	4	5
13.	A wife's professional career is as important as that of her husband.	1	2	3	4	5
14.	It is not possible for a woman to have a successful career and be a good wife and mother.	1	2	3	4	5
15.	A girl who is interested in math or science tends to be shy and introverted.	1	2	3	4	5
16.	As a result of this project, I now know of more resources to assist me in decreasing math anxiety and sex stereotyping.	1	2	3	4	5

MATH PROJECT

List 15 occupations requiring competency in mathematics.

JOB TITLE	ENTRY REQUIREMENTS	JOB DUTIES

*The Questionnaire was adapted in part from a national assessment of performance and participation of Women in Mathematics.

MATH PROJECT

MAY 1979

COUNSELOR ATTITUDINAL QUESTIONNAIRE*

Please use the following rating scale to answer questions 1 - 15.

1	2	3	4	5
Strongly disagree				Strongly agree

1.	I have expected girls to do well in mathematics.	1	2	3	4	5
2.	I do not pay too much attention to girls' math grades.	1	2	3	4	5
3.	I encourage girls to take all the math they can.	1	2	3	4	5
4.	I encourage girls to take no more math than is required to graduate.	1	2	3	4	5
5.	I have encouraged girls to enter non-traditional math-related fields.	1	2	3	4	5
6.	High school math skills are vital for keeping a wide range of career options open.	1	2	3	4	5
7.	I encourage boys to be scientists, engineers, and mathematicians more so than I do with girls.	1	2	3	4	5
8.	As a whole, boys are better in math than girls.	1	2	3	4	5
9.	I seldom counsel girls about mathematics.	1	2	3	4	5
10.	Early career plans are important in the development of math-related careers.	1	2	3	4	5
11.	Boys have less "math anxiety" than girls.	1	2	3	4	5
12.	A wife's professional career is as important as that of her husband's.	1	2	3	4	5
13.	It is not possible for a woman to have a successful career and be a good wife and mother.	1	2	3	4	5
14.	Most men prefer to work with men, not women colleagues.	1	2	3	4	5
15.	A girl who is interested in math or science tends to be shy and introverted.	1	2	3	4	5
16.	As a result of this project, I now know of more resources to assist me in decreasing math anxiety and sex stereotyping.	1	2	3	4	5

List 15 occupations requiring competency in mathematics.

JOB TITLE	ENTRY REQUIREMENTS	JOB DUTIES

*The Questionnaire was adapted in part from a national assessment of performance and participation of Women in Mathematics.

MATH PROJECT

WEST HIGH SCHOOL

May 21, 1979

6:30 p.m. to 9:30 p.m.

PARENTS' EVALUATION

1. Do you feel your daughter benefited by involvement in the Math Project?

   Please circle one. Low 1 2 3 4 5 High

2. Did your awareness of possible career choices requiring math increase since your daughter entered the Project?

   Please circle one. Low 1 2 3 4 5 High

3. What do you feel was most helpful for your daughter?

4. If there were an opportunity to continue the program, what do you think should be included?

MATH PROJECT

May 1979

NAME_____ DATE_____

POSITION _____ SCHOOL _____

EVALUATION OF MATH PROJECT

POSITIVE THINGS

HOW COULD IT HAVE BEEN IMPROVED?

COMMENTS

APPENDIX C

REVIEW OF COMMUNITY ADVISORY MEETING

REVIEW OF THE GROUP DISCUSSIONS
OF THE COMMUNITY ADVISORY COMMITTEE

MOTIVATING GIRLS TO PREPARE
FOR MATH-RELATED OCCUPATIONS

January 24, 1979

EDUCATION

Improved math preparation for elementary teachers.

Stress preparation in basic fundamentals of math.

Help elementary teachers work with math anxiety.

Eliminate sex bias in books and word problems.

Minimize sterotyping in talking about careers.

Begin discussing careers early in elementary school.

Discuss life styles early.

Emphasis careers - Not just girls marrying and boys getting jobs.

Blow-up the Cinderella myth.

Teachers and Counselors should be better informed re: Opportunities for women in the private sector.

More math courses should be required for graduation.

Use books that eliminate sex stereotyping.

Have attractive female math teachers as role models within education.

Work with male math teachers to raise consciousness of how they deal with women.

Work with teachers who are not math teachers and reduce math anxities. Eliminate hidden messages going to students.

Reinforce students who show discouragement.

Encourage students to be academically successful - show pride in intellectual accomplishment.

Provide special rewards for girls with outstanding achievement so it becomes an honor - not an embarrassment to their boyfriends and family.

A desire to maintain high grade point average often is in the way of student taking more difficult math classes.

Show interrelatedness of math with other disciplines.

Example: Allow science teachers to actively recruit for math classes, in electives and math, Physics, Biology, Business; possibly even team teaching, to give students an awareness of the various applications of mathematics.

Emphasize related careers -
Examples: - Technical Writing - blueprint reading.
Utilize strengths in more than one academic area.

Utilize college math departments to help students understand the class content of higher math and also interdependence of math and other disciplines.

Re-establish Business/Industry Student Day.

Begin educating girls earlier to the variety of opportunities that may be available to them.

Investigate career clusters early in their schooling.

Money is a motivator. Because of the relationship of salaries to life styles - students should be aware of salary potential of jobs.

Sell money aspect of jobs.

Proper background allows freedom of movement in job assignments and geographically.

Understand job futures.

Work with professional organizations such as Society of Women Engineers, to provide role models, speakers and mentors. Invite representatives from the Society of University Women, especially non-math majors who can relate to difficulties in work environment because they did not gain the necessary background in math.

Validate need of engineers. Help students become more aware of classified ads.

Have students who have had successful work experience discuss this with other students.

Have upper grade students of calculus and trigonometry talk to 9th and 10th graders about math.

Perhaps re-establish the homeroom - to give a new focus - a place to disseminate information.

Distribute attractive materials, films.

Have Science, Math, Engineering days at the High Schools.

Try to eliminate feelings of parents and teachers that it is all right for a girl not to try in math - she may not need it - instead, encourage them to do their work - become involved in the program.

Help girls realize they can use their intelligence and still be attractive to boys.

To help ease peeer pressure - possibly segregate math classes, so girls will not be embarrassed by success, or, pair students - male and female to work cooperatively.

Possibly through special classes, or groups, help boys understand girls can be feminine yet competent in math and math-related careers.

Help students understand the concept and importance of the ERA.

FAMILY

A major component of the problem is the early stereotyping - parents could assist by directing childrens' attention to or allowing participation in non-typical roles.

Encourage girls early to be more mechanical.

Through P.T.A., Media, Open Houses, and letters, help parents realize their daughter's potential, as well as, opportunities for success in technical careers.

Parents should be better informed of opportunities in the business world. Help daughters broaden their prospectives to possible career choices.

Encourage parents to take their daughters to places where women are professionals - dentists, physicians, scientists - to see successful role models.

Help daughters realize a career and family are possible.

Possibly have math anxiety classes for mothers.

BUSINESS/INDUSTRY

Help change attitudes through extensive use of successful role models.

Take students into industry to see women involved in stimulating, exciting, work environments.

Women from industry come to high schools to assist in discussing careers and work with students in a tutorial role.

Provide work experience and internship opportunities for students.

Make information re: job duties, salaries, and futures, available to schools.

Industries set up an advertising budget - possibly discuss availability of openings for women in engineering and other math-related careers.

Commercial in movie house - there are jobs in engineering, etc., for women.

Commercials - show women in technical professional roles.

Provide attractive posters and films to use at schools and in Career Centers.

APPENDIX D

EVALUATIONS

EVALUATION

To assess the effectiveness of the project, each group of participants by means of a questionnaire, was asked to comment on what they considered the benefits of the project and how they felt it could be improved.

Student comments:

Benefits of the program:

1. Learning about different careers available involving math.
2. Helping to decide future.
3. Field trips.
4. Talking to women active in math-related fields.
5. Finding what math specific careers required.

What would have made the program better?

1. More field trips.
2. Better timing/spacing of field trips.
3. More variety of career guest speakers.

Parent comments:

Benefits of the program:

1. Making her more aware of the need for a good education.
2. It gave her more incentive to study harder in math.
3. Increased daughter's self-confidence.
4. Broadened her view of career choices.
5. More motivation to improve her math scores.
6. Discuss with peers new-found knowledge.
7. Daughter's attitude toward math was negative before being involved in the program.
8. Recognition by teachers and parents that her success was important to them.
9. Identifying with women professionals on an informal basis.

What would have made the program better?

1. A one-year project is not enough.
2. More visits to more places.
3. More workshops for parents.
4. Include summer internship programs.
5. Difficult to miss other classes to go on trips.

Teacher/Counselor comments:

Benefits of the program:

1. Developed a more positive attitude about girls.
2. Community and industry awareness and involvement increased.
3. Student, teacher, parent awareness and involvement increased on more levels.

Teacher/Counselor comments:

Benefits of the program:

4. Awareness that girls need increased encouragement to go on in math.
5. Excellent opportunity for girls to talk to successful women in industry.

What would have made the program better?

1. Calendar - schedule of events.
2. Timing of events could be better - a year-long calendar.
3. A person at each school full-time whom the students could identify with.
4. Organize a type of math-science booster club with parents and students.
5. Work with middle school girls to help prepare them.
6. Emphasis should have been on tenth and eleventh grade girls.

A Consultant with the Division of Program Evaluation, Research, and Pupil Services with the Los Angeles County Schools conducted a workshop with teachers and counselors to evaluate the program and to make plans for the following school year. That evaluation is attached.

OFFICE OF THE LOS ANGELES COUNTY SUPERINTENDENT OF SCHOOLS

RICHARD M. CLOWES, *Superintendent*

June 18, 1979

Torrance Unified School District
2335 Plaza del Amo
Torrance, CA 90509

Attention: Barbara Prillwitz, Project Director
"Motivating Girls to Prepare for
Math-Related Occupations"

Dear Barbara:

Summarizing Brainstorming and Rap Session

We have attached summaries of the brainstorming and rap sessions held to provide closure as well as material for on-going activities of your math project. The meeting was held on May 25, 1979, in South High School and attended by counselors and teachers concerned with the project. Your project assistant has a listing of those attending.

The group was most enthusiastic regarding the project and anxious that it should be continued.

Congratulations.

Sincerely,

Alice

Alice Healy-Sesno, Ph.D.
Consultant
Division of Program Evaluation,
Research, and Pupil Services
(213) 922-6301

AHS:gw

Enclosure

Summarizing Roundup Session for State Project Report

BENEFITS

1. The project increased awareness of careers in math for students and staff.
2. More female students appear to be signing up for math classes.
3. The in-service sessions were both informative and pleasureable.
4. Counselor awareness of the importance of the issue was heightened.
5. The involvement of parents wherever or whenever it occurred was most positive.
6. Excellent field trips and in-service sessions, as well as seeing how much students appreciated and enjoyed the project efforts, went a long way toward re-enforcing teacher involvement.

RECOMMENDATIONS:

1. Have more presentations for parents.
2. Get off to a faster start.
3. Have a yearly calendar of events prepared in advance by an advisory council made up of parent, teacher, counselor and student from each school. Not every member of the advisory council must be present at every meeting but at least they would have an opportunity for input.
4. Have the advisory committee appoint one person at each school to introduce the project and serve as liaison between school personnel and project headquarters. This person could also be utilized as a "prodder" or one who encourages others to attend in-services and other project functions.
5. Have a clear identification of all students involved in the project. This would be helpful so that teachers might continually reinforce those students during the school year.
6. Launch the project with a cocktail party or some other method of attention getting function. Following this party a letter would be sent to everyone involved as well as all other staff in schools, formally stating the goals of the project and the techniques and procedures by which the goals might be met. Do not schedule any activity during the month of June, for this time is always heavily scheduled.

COMMENTS:

1. The development of a slide presentation of actual trips taken by teachers in the school and subsequently shown in other classrooms would go a long way toward establishing good public relations toward the project.

2. The film described above as well as any speakers elected should be showcased in the classrooms rather than the career center where student attendance at functions is often light.

3. While the target group is 9th grade students, something should be done prior to 9th grade when female students are not as readily influenced by cultural expectations regarding the male-female role.

4. When a company calls the project director offering summer jobs for students, the project officials might wish to suggest that teachers are also available for summer jobs in other than entry level capacities.

AHS:gw
6-79

Report of Brainstorming Groups
Re Concept Continuation in September 1979

1. Have Counselors run in-service workshops on project's goals and procedures.
2. Have teachers identify and be aware of high achieving girls.
3. Arrange for teachers to go on field trips to an even greater degree than last year. (E. Schmitt.)*
4. Advertise the positive features of advanced math and science. Advertise (by posters, etc.) the advantages to students if they take math and science course.
5. Use speakers especially women for girl students to identify with, in order to reinforce the project.
6. Use existing Project 3x5 file to implement program goals.
7. CR for interested teachers. (V. Bistorotic, K Curr.)*
8. Push math club membership and schedules. (Evelyn Schmitt.)*
9. Push science club and activities.
10. Math teachers identify high achieving girls to counselors listing them. (J. Cochran)*
11. Have teachers become counselors as in SWAS (go out to breakfast, etc., to build and reinforce understanding).
12. Exploratory work stations during school year for identified math girls.
13. Have parents work on math project with teachers.
14. Have math teachers talk about math related careers in the classroom.
15. Have field trips involving teachers, students, and parents at such places as Caltech, TRW, and CSC.
16. Have speakers on related careers.
17. Have visits to math departments of universities and colleges.
18. Have a math fair for incoming 9th year students.
19. Have a girls' math meet with competing schools.

AHS:gw
6-79

*People at sessions volunteering to spearhead idea.

APPENDIX E

PROJECT PERFORMANCE MANAGEMENT FORMS

PROJECT PERFORMANCE MANAGEMENT
FOR
MOTIVATING GIRLS TO PREPARE FOR MATH-RELATED OCCUPATIONS
PROJECT NUMBER: 19-65060-3-8-231

FINAL REPORT

PROJECT PERFORMANCE MANAGEMENT
FOR
MOTIVATING GIRLS TO PREPARE FOR MATH-RELATED OCCUPATIONS
PROJECT NUMBER: 19-65060-3-8-231

FINAL REPORT

RESTATEMENT OF PROGRAM OBJECTIVES (4) AND ANTICIPATED OUTCOMES (4)	REVIEW OF ACTIVITIES (3)	RESTATEMENT OF PROGRAM EVALUATION (5) AND ACTUAL OUTCOMES (5)	Objective Met	Objective Not Met	Objective Partially Met	Differences (6)
1. A minimum of fifty ninth grade girls who have math potential and low motivation to succeed in math or with other handicaps will be identified.	1.1.1 Ninth grade girls were identified using eighth grade Comprehensive Tests of Basic Skills (CTBS) scores. 1.1.2 Girls whose scores ranged from the 66th to the 100th percentile were selected. 1.1.3 Final grades from eighth grade math courses were tabulated. 1.1.4 First quarter ninth grade math grades were recorded. 1.1.5 Recommendations from ninth grade math teachers were collected for each student. 1.2.1 The treatment and control groups were identified. 1.2.2 Students were randomly selected from a compiled list, stipulating that students in a control group could not be with participating teachers. 1.3.1 An orientation meeting was held. 1.3.2 The Project Manager met with small groups of students from the list of proposed participants. Goals of the Project were explained. Student data sheets and questionnaires were completed by students electing to participate in the program. 1.3.3 Participating students and their parents met with representatives from the industrial community. Goals of the program were reviewed and needs of the industrial community were discussed.	1. A list of identified girls will be available by November 1, 1978 in the District Guidance Office. The objective was met by mid-December. (6) Reason: We had planned to include results of the ninth grade Differential Aptitude Test (DAT) which is normally administered in October. However, this year these materials were not available until after the first of the year.	X			

PROJECT PERFORMANCE MANAGEMENT
FOR
MOTIVATING GIRLS TO PREPARE FOR MATH-RELATED OCCUPATIONS
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FINAL REPORT

RESTATEMENT OF PROGRAM OBJECTIVES (4) AND ANTICIPATED OUTCOMES (4)	REVIEW OF ACTIVITIES (3)	RESTATEMENT OF PROGRAM EVALUATION (5) AND ACTUAL OUTCOMES (5)	Objective Met	Objective Not Met	Objective Partially Met	Differences (6)
2. A minimum of thirty members of business, industry and the professions willing to assist students, counselors and teachers learn about the math-related occupations in their organizations will be identified.	2.1.1 A Community Advisory Group was established. 2.1.2 The Project Manager met with a small group of business representatives and school administrators in a planning session. 2.1.3 Twenty (20) representatives of business and industry met with participating counselors, teachers, and administrators to discuss the goals of the project, the needs of education, and the needs of business. 2.1.4 Business and professional people willing to assist students, teachers and counselors were listed. 2.2 Additional community contacts willing to work with students, teachers and counselors were made throughout the duration of the project.	2. Descriptions of at least thirty (30) work stations will be available in the District Guidance Office by December 1978. The objective was met by mid-January. (6) Reason: It was necessary to postpone the meeting of the Community Advisory Group until January.	X			

PROJECT PERFORMANCE MANAGEMENT
FOR
MOTIVATING GIRLS TO PREPARE FOR MATH-RELATED OCCUPATIONS
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FINAL REPORT

RESTATEMENT OF PROGRAM OBJECTIVES (4) AND ANTICIPATED OUTCOMES (4)	REVIEW OF ACTIVITIES (3)	RESTATEMENT OF PROGRAM EVALUATION (5) AND ACTUAL OUTCOMES (5)	Objective Met	Not Met Objective	Partially Met Objective	Differences (6)
3. Counselors and teachers will be able to describe with relevant detail at least fifteen occupations requiring competency in mathematics.	3.1.1 Counselors and teachers attended a meeting with presentations by three panels: - Society of Women Engineers - Women in Management - Women in Science and Medicine 3.1.2 A small group discussion followed formal presentation leading to a better understanding of role, duties and qualifications. 3.2 Counselors and teachers met with representatives of business, industry, and women role models to gain insight, understanding of job duties, and employment opportunities. 3.3.1 Women teachers and counselors attended a luncheon for ninth grade girls participating in the program. Role models met with small groups to discuss job duties and career planning. 3.3.2 Teachers and counselors were invited to meet with scientists and mathematicians at Jet Propulsion Laboratory at the time of the Jupiter by-pass. 3.4.1 Teachers and counselors hosted workshops for students and parents conducted by women engineers, women in science, and women in business.	3. A sampling of teachers and counselors will be assessed by means of a written questionnaire before November 15, 1978. The objective was met in December. In a sampling taken in December, no participants described fifteen (15) occupations. In June, 1979, 63% of the sampling were able to describe fifteen (15) occupations. (6) Reason: Due to a conflict of scheduling by the presenter, the orientation meeting scheduled for November was postponed until December.	X			

PROJECT PERFORMANCE MANAGEMENT
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FINAL REPORT

RESTATEMENT OF PROGRAM OBJECTIVES (4) AND ANTICIPATED OUTCOMES (4)	REVIEW OF ACTIVITIES (3)	RESTATEMENT OF PROGRAM EVALUATION (5) AND ACTUAL OUTCOMES (5)	Objective Met	Objective Not Met	Objective Partially Met	Differences (6)
4. In each of two high schools as a result of community visitations a minimum of twenty-five girls with math potential and low aspiration or other handicap will be able to describe accurately and in detail four occupations of interest to them which require math skills.	4.1 Many off-campus visits were scheduled. 4.1.1 Rockwell - Tour to see aerospace industry in general and mock-up of space shuttle to highlight trip. 4.1.2 Aerospace - Visits to the lazer and crystal labs and a tour of the computer facilities. 4.1.3 Long Beach State - Women in engineering, sponsored a luncheon and panel presentations to girls on opportunities in engineering; requirements in high school and college. 4.1.4 Xerox - Tour of computer operations facility and description of functions of computers; i.e. programming data bank, etc. 4.1.5 Northrop University - Tour of campus and a special program with "Women in Aviation", including a pilot, F.A.A. inspector, astronaut, and first woman pilot. 4.1.6 Loyola University - Workshop on "Expanding Your Horizons" in science and math - a conference for students, parents, counselors, and teachers. 4.1.7 South Bay Hospital - Tour of facility including X-ray, pharmacy, laboratory; staff presentations on their duties within hospital setting. 4.2 Role models were invited to the schools throughout the year.	4. A questionnaire asking fifty (50) students to describe four occupations in detail will be administered before December 1, 1978. The objective was met. In a questionnaire given to girls who participated in the program, thirty-nine were able to describe accurately four occupations of interest to them which required math skills. Eighteen girls listed three occupations, the duties and requirements. (6) Reason: When moving the project up six months, an error was made in the above date which should have read June 1, 1979.	X			

PROJECT PERFORMANCE MANAGEMENT
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RESTATEMENT OF PROGRAM OBJECTIVES (4) AND ANTICIPATED OUTCOMES (4)	REVIEW OF ACTIVITIES (3)	RESTATEMENT OF PROGRAM EVALUATION (5) AND ACTUAL OUTCOMES (5)	Objective Met	Objective Not Met	Objective Partially Met	Differences (6)
	4.2.1 Each participating school sponsored a luncheon. Women in engineering, business, science, and medicine met with small groups of ninth grade students to discuss professional responsibilities. Following the luncheon, they met with larger groups of 10-12th grade students to discuss their career fields and answer questions. 4.2.2 A series of lunch-hour seminars were scheduled at each school. Some role models included were: women dentists, veterinarians, marine biologists, bankers, and psychologists. 4.2.3 An evening workshop was scheduled where students and parents had the opportunity to experience math as used by engineers, scientists, and business.					

PROJECT PERFORMANCE MANAGEMENT
FOR
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RESTATEMENT OF PROGRAM OBJECTIVES (4) AND ANTICIPATED OUTCOMES (4)	REVIEW OF ACTIVITIES (3)	RESTATEMENT OF PROGRAM EVALUATION (5) AND ACTUAL OUTCOMES (5)	Objective Met	Objective Not Met	Objective Partially Met	Differences (6)
5. Selected teachers in math will be able to demonstrate increased ability to motivate girls to succeed in math.	5.1 Workshops and seminars were scheduled. 5.1.1 A workshop was held to help recognize and review sex-role stereotypes. 5.1.2 A seminar on understanding how to deal with math-related anxieties of students was scheduled for teachers and counselors. 5.1.3 Many contacts with role models were made. 5.2.1 Teachers and counselors met with representatives of business and industry to gain insight in the needs and opportunities in the business community. 5.2.2 Panels of role models in engineering, business, science, and medicine presented an overview of their respective disciplines. 5.2.3 Small group discussions were held with successful women professionals, giving teachers an opportunity to gain insight into the types of background and training that contributed to their success. 5.2.4 Teachers hosted workshops where professionals in business, engineering, and science helped students experience math as it is used in the disciplines of their professions.	5. An analysis of pre-post audio tape recordings of teacher-student interaction in the classroom to be completed by May 1979 will show: 1. More positive re-enforcement of student participation. 2. An increase in teacher response to student feelings. Objective partially met. The teachers "demonstrated-ability" to motivate girls was evidenced by comments made by students, and inferred in responses to a questionnaire administered to both students and parents. (6) Reason: Staff reduction due to cutbacks in full-time CETA administrative assistance greatly reduced the pupil contact hours, information gathering and dissemination time.			X	

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FINAL REPORT

RESTATEMENT OF PROGRAM OBJECTIVES (4) AND ANTICIPATED OUTCOMES (4)	REVIEW OF ACTIVITIES (3)	RESTATEMENT OF PROGRAM EVALUATION (5) AND ACTUAL OUTCOMES (5)	Objective Met	Objective Not Met	Objective Partially Met	Differences (6)
6. The percentage of ninth grade girls electing to continue the study of math in grade ten will be greater in 1979 than in 1978.	6.1.1 Participation by students in the project are enumerated in objective 4. 6.1.2 Presentations by women scientists sponsored by the National Science Foundation were made to all interested students. 6.1.3 Interest and participation in the project by selected teachers and counselors helped the general student population recognize the importance of continuing the study of math beyond the requirements for graduation.	6. Math choices made by ninth grade girls in May 1979 will show an increase over math choices made by ninth grade girls in May 1978. The objective was met. A comparison of the 9/10th grade students enrolled in the fall of 1978 and the classes selected for the fall of 1979 indicated a 6% increase of students electing math classes. 1978-79 / 1979-80 South 85% / 93% West 87% / 90% Average 86% / 92%	X			

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7. The percentage of tenth grade girls electing to continue the study of math in the eleventh grade will be greater in 1979 than in 1978.	7.1.1 Participation by students in the project are enumerated in objective 4. 7.1.2 Presentations by women scientists sponsored by the National Science Foundation were made to all interested students. 7.1.3 Interest and participation in the project by selected teachers and counselors helped the general student population recognize the importance of continuing the study of math beyond the requirements for graduation.	7. Math choices made by tenth grade girls in 1979 will show an increase when compared to math choices made by tenth grade girls in 1978. The objective was met. A comparison of the 10/11th grade students enrolled in the fall of 1978 and the classes selected for the fall of 1979 indicated a 20% increase of students electing math classes. 1978-79 / 1979-80 South 39% / 58% West 37% / 58% Average 38% / 58%	X			

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8. At the end of the ninth grade (1979) 10% more girls will indicate an interest in a math-related career than they did in the fall of 1978.	8.1.1 Please refer to the activities as enumerated in Objective 4.	8. From a list of possible career choices, girls will be asked to list top five preferences in February 1979 and in May 1979. The objective was met. At the beginning of the project girls were asked to list their first three career choices. These were compared with responses on the occupations listed at the end of the project. Eighteen percent (18%) more girls indicated an interest in math-related careers.	X			

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9. Ten percent more ninth grade girls will indicate a reduction in math anxiety and more confidence in ability to handle math.	9.1.1 Off-campus visits to business and industry as listed in objective 4. 9.2.1 As listed in objective 4, role models visiting campus discussed their need for math and the use of mathematics in their careers. 9.3.1 Students were encouraged by teachers and counselors aware of the need for advanced mathematics in professional-level careers.	9. Pre-post assessment, using a locally constructed questionnaire, will show a 10% decrease in the number of girls who (a) report low motivation or (b) high math anxiety between February 1979 and June 1979. The objective was met. (a) Forty-nine percent (49%) stated they felt more confident than before their participation in the Project. (b) Fifty-two percent (52%) of the girls indicated a reduction in math anxiety.	X			

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10. Selected counselors and math teachers will demonstrate increased awareness of and information about sex-role stereotyping.	10.1 A workshop was scheduled for counselors and teachers to help them recognize the subtleties of sex-role stereotyping and to explore means of effectively dealing with it in the classroom and the counseling office. 10.2 Meetings with successful women in non-traditional roles were scheduled to discuss the problems that they have encountered in their career development. 10.3 Teachers and counselors met with representatives of business and industry to gain an understanding of the problems as they exist in the industrial community.	10. Counselor and teacher self-assessment to be completed by June 1, 1979. The objective was met. (a) An attitudinal survey administered in December and again in June to participating counselors and teachers showed a 5% positive change in their expectation of females in mathematics. (b) As a result of their participation, counselors and teachers agreed that their knowledge of resources to assist in decreasing sex-role stereotyping had increased.	X			

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11. In each of two high schools at least twenty-five ninth grade girls will be able to describe how math competency contributes to success in a variety of vocational and pre-professional program offerings.	11.1 Girls met with role models representing many vocational and profession careers. (See Objective 4) The interdependence of mathematics with other skills was explored. 11.2 During visits to business and industry, students were able to observe the interdependency of math with other disciplines.	11. As part of a locally constructed questionnaire, fifty girls will be asked, before May 1, 1979, to show relevancy between math and five other school subjects. The objective was met. On a questionnaire completed at the end of May 1979, 86% of the girls were able to show relevancy between math and five other school subjects.	X			

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12. Parents of ninth grade math students will indicate increased knowledge about career opportunities related to math competency.	12.1 In January 1979, parents of participating students were invited to an orientation meeting. 12.1.1 A panel of business people, which included two very successful role models, discussed the career opportunities requiring a math background. 12.1.2 The needs and opportunities for qualified women in business and industry were discussed. 12.2 In May 1979, a workshop for parents and students was scheduled with women engineers, scientists, and business representatives. 12.2.1 A panel representing engineers, business, and science gave an overview of each field, discussed the present job market, and projections for the future, especially focusing on the opportunities for women.	12. The majority of a 10% sampling of parents in June 1979 will respond to written inquiry indicating knowledge of math-related career opportunities. The objective was met. On a scale of 1-5 (5 being highest) 73% of parents responding to the questionnaire indicated that their knowledge of math-related career opportunities increased as a result of their daughter's participation in the project.	X			

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13. A computerized program will be developed for counselors and teachers with information about specific community work sites.	13.1 Teachers and counselors contacted business and professional people in the community. 13.1.1 A card file was developed indicating the type of help business and professional people are willing to give, i.e., on off-campus visits, large or small groups, and types of presentations. 13.1.2 Copies of the file will be distributed to math and science teachers and counselors.	13. The program will be available on computer terminals at the high schools by March 1, 1979. It was impossible to meet the objective as stated. However, in lieu of the computer program, teachers and counselors developed a card file of business contacts that contain approximately 150 names of professionals representing math-related careers willing to assist teachers, counselors, and students. (6) Reason: The district was without a computer programmer for several months, making it impossible to complete the objective as written.	X			X

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14. A systematic process for updating the computer program and a model for extending it into other academic areas will be developed.	PLANNED ACTIVITIES 14.1 The card file described in objective 13, will be available for math teachers, science teachers, and counselors. 14.1.1 As each resource is used, an evaluation will be recorded in the control location at each school. 14.1.2 An attempt will be made to monitor the number of times an resource is used, in order not to exhaust any one resource. 14.2 As new resources are developed, new and update cards will be distributed.	14. A description of the process and of the model will be available in written form by May 1, 1979. It was impossible to meet the objective as stated. The card files described in objective 13, will be updated and maintained at each participating school. In one high school, an administrative assistant will be responsible, at the other a member of the counseling staff will assume the responsibility (6) Reason: The district was without a computer programmer for several months, making it impossible to complete the objective as written		X		X

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15. A minimum of 200 mini exploratory work visits will be made by students, teachers, and counselors during 1978-1979.	15.1 The business and industry visits made by students are listed in objective 4. 15.2 The activities for teachers and counselors are listed in objectives 2, 3, and 13.	15. A list of students, teachers, counselors and the sites they have visited will be available by June 1, 1979. Due to scheduling conflicts and lack of available buses, greater emphasis was placed on bringing role models to the schools. Over 175 student contacts were made with role models. Approximately 50 women in engineering, science, business and medicine presented workshops and seminars for teachers and counselors.	X			